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ABSTRACT

This report presents the pre-and posttest results for the kindergarten year of the Kamehameha Early Education Program (KEEP) Class 2, 1973-1974. Results are presented for the Wechsler Preschool and Primary Scale of Intelligence (WPPSI), the Metropolitan Readiness Test (MRT), and the Standard English Repetition Test (SERT). Comparisons are made with the pre- and posttest results of Class I's kindergarten year, 1972-1973. Significant correlates of the three tests and certain SES variables, such as parents' education and occupation, are presented. (Author/JMB)

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The Kamehameha Early Education Program

The Kamehameha Early Education Program (KEEP) is a research and development program of The Kamehameha Schools/Bernice P. Bishop Estate. The mission of KEEP is the development, demonstration, and dissemination of methods for improving the education of Hawaiian and Part-Hawaiian children. These activities are conducted at the Ka Na'i Pono Research and Demonstration School, and in public classrooms in cooperation with the State Department of Education. KEEP projects and activities involve many aspects of the educational process, including teacher training, curriculum development, and child motivation, language, and cognition. More detailed descriptions of KEEP's history and operations are presented in Technical Reports #1-4.

Abstract

This report presents the pre- and posttest results for the kindergarten year of KEEP's Class 2, 1973-1974. Results are presented for the WPPSI, the Metropolitan Readiness Test, and the SERT. Comparisons are made with the pre- and posttest results of Class I's kindergarten year, 1972-1973. Significant correlates of the three tests and certain SES variables, such as parents' education and occupation, are presented.

Technical Report #40

Pre- and Post-Test Results of KEEP Class 2: 1973-74*

Candy Fox

The research nature of KEEP (Kamehameha Early Education Program) means that it is crucial to measure student achievement in ways that allow for evaluation of progress. Therefore, children are tested fairly extensively. Testing in the Fall when the children enter school is important for determining baseline proficiency. Spring testing indicates the amount of change in individuals and the class. In another report the results of three testing periods will be compared to the performance of Island children in other schools. (See Technical Report #36.) In the present report the progress of one class of KEEP children, Class 2, is evaluated in terms of the norms provided by test publishers.

The tests administered to the KEEP class in the Fall of their kindergarten year (1973) were the WPPSI (Weschler Preschool and Primary Scale of Intelligence), the METRO (Metropolitan Readiness Test), and the SERT (Standard English Repetition Test). The WPPSI provides three IQ scores: full scale, verbal, and performance, plus eleven subtest scores. The METRO is a test of first grade readiness, and the SERT measures Standard English proficiency. This paper presents comparisons of Fall and Spring scores for each individual test, comparisons of the three tests among themselves, and comparisons of Class 2 1973-74 scores, from which the data for this paper were taken, with Class 1

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data from the previous year, 1972-73 (see Technical Report #5).

The statistic used in calculating correlations was the Pearson product-moment coefficient of correlation. It is understood that with the small N of 27, it is impossible to make statements of fact. These calculations simply indicate trends and directions of change.

Fall and Spring scores for all measures of all three tests indicated substantial changes with virtually no changes in the relative rankings of the students (see Table 1). Full scale IQ jumped from a class mean of 83.82 in the Fall to 97.15 in the Spring, a 13.7% increase ($r = .882$, $p < .01$, $N=27$). Verbal IQ increased almost ten points to 90.52 ($r = .918$, $p < .01$, $N=27$) and performance IQ close to fourteen points ($r = .666$, $p < .01$, $N=27$). The METRO raw score more than doubled from Fall to Spring (25.16 to 53.64, $r = .722$, $p < .01$, $N=24$) and the percentile score went from 12.52 to 50.84 ($r = .551$, $p < .01$, $N=24$). Improvements in SERT scores were equally marked. The Fall to Spring increase in Standard English (SE) correct was from 9.5 to 13.3, a 28.6% jump ($r = .869$, $p < .01$, $N=26$). Since the children in the school were selected at random, attributing the shifts entirely to regression effects is accordingly less plausible (see Technical Report #13).

As expected, Fall and Spring WPPSI showed positive significant correlations on all three scales (see Table 2), as did the Fall and Spring METRO, and the Fall and Spring SERT. Between-test correlations of WPPSI, METRO, and SERT were highly significant (see Table 3) for both Fall and Spring scores. This is not a startling finding, as it would be expected that an overlap would occur in the kinds of skills, knowledge, and cognitive and developmental processes which are measured on these three tests. What is somewhat surprising is that the change scores, that is, the difference between Fall and Spring testings, were not consistently highly correlated. For example, full scale IQ change had a relatively low correlation ($r=-.327$, $N=27$) to Fall full scale IQ. In

Table 1

Means and Standard Deviations of WPPSI, Metropolitan Readiness Test, and SERT: Class 2, 1973-74

	WPPSI (N=27)			
	Fall		Spring	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.
Full Scale	83.82	16.40	97.15	15.17
Verbal	80.63	18.14	90.52	18.16
Performance	90.00	14.59	104.93	12.33
	Metropolitan (N=25)			
	Fall		Spring	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.
Raw	25.16	15.78	53.64	16.33
Percentile	12.52	16.48	50.84	28.02
	SERT (N=27)			
	Fall		Spring	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.
SE Correct	9.5	7.18	13.30	8.19
Other SE	1.92	1.79	1.44	1.19
Total SE	11.42	8.19	14.74	8.84

fact, the only test score it was positively and significantly correlated with was Spring performance IQ ($r = .474$, $p < .05$, $N=27$). IQ performance and METRO change scores were most frequently significantly correlated with the three tests, IQ, METRO and SERT (see Table 4).

Table 2

Correlations of Fall and Spring WPPSI, Metropolitan, and SERT
Class 2, 1973-73

	WPPSI Fall (N=27)		
WPPSI Spring	Full Scale	Verbal	Performance
Full Scale	.882	.807	.828
Verbal	.928	.918	.776
Performance	.547	.392	.666
	METRO Fall (N=24)		
Metro Spring	Raw	Percentile	
Raw	.722	.537	
Percentile	.727	.551	
	SERT Fall (N=26)		
SERT Spring	SE Correct	Other SE	Total SE
SE Correct	.869	.431	.856
Other SE	.522	.526	.573
Total SE	.875	.467	.869

Hi and Lo IQ Change Groups

The fall mean for the full scale IQ was 83.82, as previously mentioned, with a standard deviation of 16.40. Because of this variability, the class was divided into two groups: those whose IQ scores changed substantially, and

Table 3

Correlations of WPPSI, METRO, and SERT - Pre(fall) and Post(spring) Scores
Class 2, 1973-74

	Fall WPPSI	Spring WPPSI
Fall METRO	.814 (25)*	.652 (25)
Spring METRO	.794 (25)	.861 (25)
Fall SERT	.758 (25)	.682 (26)
Spring SERT	.768 (27)	.685 (27)
	Fall METRO	**Spring METRO**
Fall SERT	.635 (25)	.672 (25)
Spring SERT	.583 (25)	.664 (25)

*all values significant at .01 level

Table 4

Correlations of Initial (Fall 1973) and Final (Spring 1974) IQ, METRO, and SERT Scores with IQ, METRO, and SERT Change Scores---Class 2, 1973-74

	WPPSI						METRO				SERT	
	Full		Verbal		Perform		Raw Score		Percent		SE Correct	
CHANGE SCORES	Fall/Spring		Fall/Spring		Fall/Spring		Fall/Spring		Fall/Spring		Fall/Spring	
Full IQ (N=27)	-3.27	.147	-.371	-.102	-.182	.474	-.350 (25)	.091	-.394 (25)	.101 (25)	-.265 (26)	-.246
Verbal IQ (N=27)	- .054	.212	-.197	.151	.141	.232	-.179 (25)	.237	-.164 (25)	.267 (25)	-.026 (26)	.006
Perform IQ (N=27)	- .464*	-.110	-.444*	-.384	-.399*	.351	-.461* (25)	.219	-.421* (25)	-.233 (25)	-.345	.267
METRO Raw (N=24)	.439*	.659**	.413	.620**	.387	.499**	.214	.812**	-.040	.812**	.418*	.513**
METRO % (N=24)	- .009	.328	-.0002	.211	.020	.406*	-.315	.343	-.397*	.346	.108	.174
SERT (N=26)	.179	.172	.153	.147	.181	.175	.023 (25)	.090 (25)	-.086 (25)	.096 (25)	-.076	.369

*p > .05
**p > .01

those who changed little. The low entering IQ score group was actually the group which changed the most. The high entering IQ score group changed the least. For this reason, the low entering group was named "Hi" to refer to its degree of change in relation to entering scores; the low change group was named "Lo."

A division of the class into two separate groups suggests certain factors which help clarify the large variation. Considering the class as a homogeneous group would have been misleading, since that part of the class that significantly improved on IQ was very different from the part of the class that changed very little. In the absence of appropriate control groups, it is prudent to reserve judgement on the extent to which the change can be attributed wholly or partially to the KEEP program. At the least, the data provide a standardized assessment of current performance levels of KEEP pupils.

The Hi group was composed of 13 students (half of the class) whose scores improved from 11-35 points on the full scale IQ measure. In the Lo group of fourteen children the range was from -1 to 10. Ten was chosen as the breaking off point because it evenly divided the class into two groups. The average Fall IQ of the Hi (change) group was 77.54 and 89.64 for the Lo (change) group, compared to an average of 83.82 for the whole class combined. By spring, however, the Hi group's average had improved 20 points to 97.54 (r= .962, $p < .01$, N=13) and the Lo group improved 7.15 points to 96.79 (r= .981, $p < .01$, N=14). Therefore, the Hi group began the year with an average IQ 12.1 points lower than the Lo group, but finished the year slightly (.75) higher.

Additional analyses of the Hi and Lo groups appears in various later sections of this paper. It should be understood that there are potential loopholes involved with data analysis when gain scores are used as a statistical measure. This method was chosen for the present evaluation for the convenience

of presentation and because KEEP is concerned with doing fine grained analysis of internal changes for heuristic purposes. This approach is admittedly speculative and exploratory in the spirit of inquiry recently advocated by Cronbach (1975). Also, by dividing groups for subsequent analysis, it provides a means of establishing correlates that are stable for both groups. Thus variables that are related significantly only to the Hi change group may be considered with greater caution than those correlated in both groups.

Comparison of Class 1 and 2 on IQ Measures

Using Class 1 kindergarteners (1972-73 data) as a comparison sample, some similarities and an important difference were found between this group and Class 2. Class 1 data revealed that the majority (85%) exhibited an inverse relationship between entering IQ and amount of IQ change (94.55-Hi; 104.46-Lo).

In Class 2, however, the relationship was not as pronounced. Only 66 2/3% of this class indicated the inverse relationship betwen entering and IQ change. Even so, the May IQ's of Class 2 Hi and Lo groups were much closer (96.79-Lo; and 97.54-Hi) than those of Class 1.

The difference between the two classes as far as the inverse relationship of entering and IQ change is concerned lies in the fact that in Class 1 only two children with low entering scores were also in the Lo group. (These children were close to the cut-off point for the high/low division). Three children in the high entering group were also high changers in Class 1. In Class 2, however, five children in the low entering group were also in the Lo group, and four in the high entering were also in the Hi group. In other words, it was not possible to say that in Class 2 those children who entered with IQ's 84-114, that is, the high entering group, would necessarily be the same children in the Lo change group, or vice versa. In Class 1 such a prediction was safer to make.

The fact that pupils with the lowest scores improved the most is a completely predictable outcome. Low scores have more "room" for change, and as such, capitalize upon the phenomenon of regression to the mean. Thus we are not prepared to argue they actually "improve" some 20 points, however, it is of program use to examine in more detail those children whose performance level changed for whatever the reasons.

IQ Change and Preschool

In the Hi group 61.5% of the children went to preschool as opposed to 92.9% who attended preschool in the Lo group. Thus a little more than one third of the Hi group (38.5%) did not go to preschool, while only 7.1% (one student) of the Lo group did not go. This is an important finding and justifies further examination.

Preschool in the Lo group is significantly correlated with ten variables (See Table 5), while preschool in the Hi group is correlated only with Fall METRO-matching. For the Lo group preschool was positively correlated with nine test score measures (the tenth variable was number of siblings). Exposure to the enriched environment of a preschool which offers experience with various perceptual-motor, cognitive, and test-taking skills, apparently is an important factor in affecting entering kindergarten IQ scores. Preschool for either the Hi or Lo group had a low correlation with any SES variables except number of siblings. It also seemed evident that whatever effects preschool has on IQ scores are compensated for during the kindergarten year, as the two groups become closer in terms of IQ scores by the end of the school year.

The expectation that preschool would be a good predictor of performance on entering test scores is not supported by the data. For the Lo group, preschool is significantly correlated only with verbal IQ for Fall ($r = .542$, $p < .05$, $N=14$), and total appropriate SE for Fall ($r = .614$, $p < .05$, $N=13$). No

Table 5

Correlates of Preschool
Low IQ Change Group, Class II, 1973-74
(N=14)

	Preschool
Verbal IQ Fall 73	.543**
WPPSI: Information Fall 73	.535**
WPPSI: Vocabulary Fall 73	.562**
WPPSI: Arithmetic Fall 73	.558**
WPPSI: Sentences Fall 73	.743** (10)
Number of Sibs	-.842*
SERT-Total Appropriate Fall 73	.614** (13)
SERT-HCE-May 74	-.582**
WPPSI: Information Spring 74	.549**
METRO: Copying-Spring 74	.621** (13)

*p < .01
**p < .05

testing measures are significantly correlated with preschool in the Hi group.

Metropolitan and Preschool

The METRO raw score and preschool had a low correlation in the Lo and Hi groups. This would seem to contradict the expectation that the skills and knowledge gained in preschool would have an effect on the "readiness" for first grade which is measured by the METRO. Apparently other factors, which are not yet completely clear, are involved.

The Metropolitan Readiness Test

The Metropolitan Readiness Test administered in the Fall and Spring of the kindergarten year is a significant predictor of a child's readiness to perform at beginning first grade level. It is valuable in helping a teacher formulate an instructional program suited to the individual needs of each child. From this test, areas can be specified in which a particular child or group of children is insufficiently prepared to cope with first grade work and the class can more efficiently be grouped according to particular instructional needs. The test is also useful for comparing readiness test results with achievement test results and teacher grades obtained later in the year.

But just what is "readiness" and what are the implications of its presence or absence? Readiness means the attainment of a sufficient level of maturity, proficiency, or skill in a range of abilities which further the acquisition of skills and knowledge in first grade. How a child arrives at an appropriate level of readiness is not a simple matter of maturation since development of readiness skills is achieved through appropriate learning experiences. This is where the teacher can be instrumental in providing the kinds of essential experiences necessary for developing skills in reading and arithmetic. If a child is expected to perform at a level for which he/she is not adequately prepared, frustration, dislike of learning, and low self-esteem are likely to be instilled in him/her very early. This is one of the main reasons why it is

important that a teacher be aware of the degree of readiness of each of her pupils.

Specifically, what are the components of readiness which predict competence in the first grade? First of all, comprehension and the use of oral language are important factors. Visual and auditory perception and discrimination, richness of verbal concepts, general reasoning ability, knowledge of numerical and quantitative relationships, sensory-motor coordination, and attentiveness are equally crucial variables. Each subtest of the METRO is constructed to measure these particular components. Word Meaning measures the child's knowledge of verbal concepts. Listening determines the child's knowledge of his/her environment as well as his/her ability to comprehend words. Visual-perceptual skills similar to those involved in word discrimination in beginning reading is measured in Matching. As a consistently dependable predictor of success in the early stages of reading, Alphabet tests the ability to recognize spoken letters of the alphabet. Besides being an indicator of a child's repertoire of number concepts, knowledge, and ability to manipulate quantitative relationships, Numbers points to a general mental alertness necessary for first grade work. Copying gets at a child's visual perception, as well as motor control much like that required in learning handwriting.

The class average for the METRO percentile score in the Fall was 12.52 (standard deviation-16.48). By Spring the average had jumped to 50.84 percentile (standard deviation-28.02). The total raw score rose from 25.16 (standard deviation-15.78) to 53.64 (standard deviation-16.33).

All of the METRO subtests indicated marked improvement from Fall to Spring. Word Meaning had the least absolute change: from 4.00 to 6.52 out of 16 possible; and Matching had the most: from 2.92 to 8.52, 14 possible. Alphabet more than doubled, going from 4.54 to 11.88, 16 possible; and all the others approximately

doubled: Listening-5.24 to 9.2, 16 possible; Numbers 5.75 to 11.36, 26 possible; and Copying-3.78 to 6.16, 14 possible. Statistical analysis indicates high positive correlations among the subtests for Fall and Spring, indicating that performance on one subtest may in some way be related to performance on the others.

The Standard English Repetition Test (SERT)

The SERT uses sentence repetitions to assess a child's level of Standard English performance. It is scored for several classes of responses. The basic score is the number of accurate repetitions of 29 critical grammatical features. Other scores include number of appropriate Standard English substitutions, number of appropriate Hawaiian-Creole substitutions and a total appropriate score composed of all of the above. The average Fall SERT (Standard English responses) score of correct repetitions was 9.5 compared to 9.18 for Class 1. By May the average had risen to 13.29 compared to 13.61 for Class 1. These are statistically significant increases for both classes; the within group rankings are stable. (Class 2: $r = .869$, $p < .01$, $N = 26$; Class 1: $r = .910$, $p < .01$, $N = 28$).

The SERT change score (the difference between Fall and Spring scores) was significantly correlated with only three variables: whether the mother is a housewife or employed, the parent's occupations, and mother's occupation--all SES variables. It is not surprising that a measure of Standard English might be reflected in those areas which effect verbal interaction patterns of families; namely, the kinds of work that parents do.

According to the data, the mother's occupational status was more related to the language patterns of her children than was that of the father. This cannot be accounted for by relatively greater status of the mother's work as the averages for mother's and father's occupation were virtually the same:

2.59 and 2.30 respectively (1=unemployed; 2=unskilled; 3=semiskilled; 4=skilled and supervisor; 5=sales and clerical; 6=semi-professional; 7=professional). The effect of the mother's occupation on her children's Standard English competency may be a factor of her more consistent presence in the family, as opposed to the (biological) father who in 18 of our 27, or 67% of the cases, is not present in the home.

Although SERT change was significantly correlated with only three variables, SERT scores for both Fall and Spring were correlated with numerous variables, among them IQ and METRO. Table 6 lists significant correlates of SERT scores for Fall and Spring. All SES variables except employment of father are significantly correlated with Fall SE correct. For the Spring scores father present and employment of father were not significantly correlated with SE correct, but all other SES measures were positively and significantly correlated.

In some cases children made responses to the SERT with Hawaii-Creole English (HCE) substitutions. If the HCE form was an appropriate response, it was scored as such. In the Fall 36.4% of the total appropriate responses to the SERT were given in Hawaii-Creole English--an average of 6.54 HCE responses compared to a total appropriate of 17.96. While the total appropriate responses increased 4.37 points to 22.33 in the Spring, HCE responses represented only 33% of the total. This decrease in percent of HCE indicates that as the year progressed, children were making fewer Hawaii-Creole substitutions and were, therefore, either relying more and more on Standard English or were learning to follow directions more explicitly.

SERT and IQ

SERT and WPPSI were highly correlated for both Fall (r= .758, $p < .01$, N=26) and Spring (r= .682, $p < .01$, N=26) administrations with the one exception of performance IQ for Spring. (See Table 6.) While the correlations

Table 6

Significant Correlates of SERT (SE Correct) for Fall and Spring Class 2, 1973-74

	Fall 1973 (N=26)	Spring 1974 (N=27)
Full IQ Fall	.758	.768
Verbal IQ Fall	.831	.862
Perform. IQ Fall	.533	.503
Information	.720	.799
Vocabulary	.632	.560
Arithmetic	.665	.689
Similarities	.775	.850
Comprehension	.826	.816
Sentences	.739	.816
Animal House	.617	.592
Geometric Design	.524	
Block Design	.339	.402
Sibs	-.590	-.575
METRO: Word Meaning	.485(25)	.487(25)
Listening	.537(25)	.416(25)
Alphabet	.593(24)	.592(24)
Numbers	.639(24)	.641(24)
Copying	.552(24)	.427(24)
Total Raw	.635(25)	.583(25)
Percentile	.577(25)	.474(25)
Mother:hse, employ.	.568	.667
Parents working	.556	.519
Parents' occup.	.486	.700
Mother's occup.		.647

Table 6 (con't)

SERT-SE correct-Fall		.869(26)
Other SE Fall	.480	.431(26)
Total SE Fall	.982	.856(26)
Total approp Fall	.849	.719(26)
SE Correct May	.869	
Other SE	.522	.491
Total SE	.875	.993
HCE	-.613	-.776
Total approp May	.761	.810
Busts	.768	-.812
Full IQ Spring	.682	.685
Verbal IQ Spring	.798	.803
Information	.640	.563
Vocabulary	.845	.748
Arithmetic	.556	.506
Similarities	.740	.769
Comprehension	.708	.712
Sentences	.718	.815
Animal House	.455	.404
METRO: Word meaning-Spring	.534(25)	.649(25)
Matching	.550(25)	.547(25)
Alphabet	.629(25)	.585(25)
Numbers	.674(25)	.604(25)
Total raw	.672(25)	.664(25)
Percentile	.668(25)	.664(25)
METRO percent change	.418(24)	.513(24)

decrease slightly from Fall to Spring, they were still significant at the .01 level.

Table 7

IQ Correlated with Fall and Spring SERT
Class 2, 1973-74

	WPPSI (IQ) Fall		
SERT	Full Scale	Verbal	Performance
Fall (N=26)			
SE Correct	.758	.831	.533
Other SE	.439*	.496	.300 n.s.
Total SE	.761	.836	.553
HCE	.062 n.s.	.091 n.s.	.056 n.s.
Approp	.673	.750	.477*
Busts	-.311 n.s.	-.325	-.161 n.s.
Spring (N=27)			
SE Correct	.768	.862	.503
Other SE	.558	.585	.404*
Total SE	.787	.878	.521
HCE	-.530	-.608	-.330 n.s.
Approp	.704	.768	.458*
Busts	-.707	-.774	-.457*

n.s.=not significant; *$p < .05$; all others $p < .01$

By checking the Hi and Lo IQ change groups, it was found that the Hi group's average SE correct mean score for Fall was 8.07 and the Lo group's average was 10.92. The Spring Hi mean score was 10.92 and the Lo group average was 15.5. So while the Hi and Lo groups came much closer together on IQ measures, a similar merging did not occur with the SERT: both IQ change groups

Table 8

Spring IQ Correlated with Fall and Spring SERT
Class 11, 1973-74

	WPPSI Spring		
SERT	Full Scale	Verbal	Performance
Fall (N=26)			
SE Correct	.682	.798	.295 n.s.
Other SE	.401*	.449*	.191 n.s.
Total SE	.685	.797	.301 n.s.
HCE	.080 n.s.	.077 n.s.	.080 n.s.
Approp	.618	.711	.293 n.s.
Busts	-.193 n.s.	-.246 n.s.	-.063 n.s.
Spring (N=27)			
SE Correct	.685	.803	.300 n.s.
Other SE	.556	.538	.404*
Total SE	.710	.817	.332 n.s.
HCE	-.332 n.s.	-.486*	.007 n.s.
Approp	-.735	.774	.457*
Busts	-.737	-.776	-.458*

n.s.=not significant; *$p < .05$; all others $p < .01$

indicated marked improvement on the SERT. The Hi group finished the year with the same score as the Lo group began. Increases in IQ were not related to increases in the SERT, as indicated by statistical analysis ($r = .013$, $N=26$).

SES and Test Scores

A one way analysis of variance was performed comparing the independent variables--father present, mother employed, parents working, parents' occupation, employment of father, occupation of father, occupation of mother, father's

education, and mother's education--with the dependent variables--IQ, SERT, and METRO. For each possible response of each independent variable a group mean was given. For example, in the category "employment of mother" the group mean for IQ Fall for the group which responded "mother-housewife" was 76.35. The group mean for IQ Fall for the group which responded "mother-employed" was 98.57 (see Table 8). In all categories for all possible responses a group mean was given for each dependent variable (see Tables 9-14).

The results indicate that these test scores differ significantly across many SES variables such as the employment and educational status of the parents. Of the nine categories, only two--occupation of mother and father present--had no significant F values; all other categories had several significant F values. No less than 12 and as many as 18 dependent variables (test scores) showed significant mean differences between the various possible groups.

Employment of Mother

Whether or not the mother is employed has a significant effect on 18 test measures (see Table 9). In only two instances were the means for the group whose mothers are housewives larger than those for employed mothers. Full scale and verbal IQ for Fall and Spring, and performance IQ for Fall have significant F values, as do Fall and Spring SE and METRO. For 16 test measures the means are larger in the groups where mothers are employed.

Parents Working

In all but one instance (SE busts-Spring) the group of both parents working had the highest test scores (see Table 10). Neither parent working was the lowest in all cases except for SE busts-Spring. In eight of 15, or about half of the instances, the "mother only working" groups had higher means than "father only working" groups. Therefore, it is not possible to make any indicative statement about relative importance of the sex of the one working parents. If

Table 9

Employment of Mother
(Means)

	P	Housewife	Employed
IQ Fall	.0022	76.35	98.57
Verball Fall	.003	73.18	97.14
Performance Fall	.0091	83.76	100.40
IQ Spring	.0122	90.65	106.86
Verbal Spring	.003	82	105
METRO Fall (raw)	.0473	20.88	36
METRO Spring (raw)	.0055	46.38	67.17
METRO Spring (%)	.0034	37.94	75.17
METRO Change (%)	.0285	28.75	51.5
SE Fall (correct)	.0087	6.88	15.67
SE to Fall	.0137	8.65	18.17
Total Approp Fall	.0469	15.06	24.5
SE Spring (correct)	.0014	9.35	20.57
SE Spring (other)	.0371	1.18	2.29
SE Spring (total)	.0012	10.77	22.86
HCE Spring	.014	8.77	3.86
Total Approp Spring	.0089	19.88	26.7
Busts Spring	.01	9.06	2.29

neither parent was working, the mean scores were much lower than if both parents worked.

Table 10

Parents Working
(Means)

	P	Neither	Mother only	Father only	Both
IQ Fall	.0372	67.3	83.5	86.1	95
Verbal Fall	.012	60.83	86.75	82.2	94.4
IQ Spring	.0352	80.83	96.75	100.3	102.8
Verbal Spring	.0094	69.17	94.5	91.89	101.8
METRO Spring	.0048	33.83	55.67	57	63.8
METRO Spring (%)	.0051	17.17	54.3	56.25	68.4
METRO Change (%)	.0219	15.83	48	33.38	52.6
SE Fall (Correct)	.0056	1.67	13	10.33	14.4
SE Total Fall	.0029	1.5	I5	12.78	17.4
Total Approp (Fall)	.0079	6.5	23	19.56	23.8
SE Spring (Correct)	.007	4.5	15.25	12.67	20.2
SE Spring (Other)	.0448	.33	1.75	1.89	2
SE Spring (Total)	.003	4.83	18	14.56	22.2
Total Approp (Spring)	.0172	16	24.25	22.2	26.4
Busts Spring	.0183	13	4.75	6.67	2.6

Occupation of Father

In the category "occupation of father" the division "professional" had one-third (four of 12) of the highest means, "skilled and supervisor" and "father not present" had one-fourth (three of 12), and "unskilled" had one-sixth (two of 12) of the highest. "Unemployed" had one half of the lowest means and none of the highest (see Table 11).

Table 11

Occupation of Father
(Means)

	P	Fa. not Present	Fa. Unemp.	Fa. Unskilled	Fa. semi-skilled	Fa. skilled	Fa. Prof.
Performance change	.0249	-3	18.67	39	16	7.29	25
Verbal Fall	.0203	102	67.78	80	72.8	95.29	101
METRO Fall	.0331	34	12	5	30.6	35	38
METRO (%) Change	.0137		27.29	56.5	81	38.7	41
SE Fall	.0093	16	3.75	10	6.2	16.29	10
SE Fall Total	.0033	19	4.38	14	7.8	19.57	12
Total Fall Approp	.0497	26	10.25	21	15	26	17
Busts Fall	.0151	28	5.53	3.5	4	3.0	12
SE Spring Correct	.0116	21	7.4	10	9	19.29	25
SE Spring Total	.0169	22	8.78	12	10.6	21.43	27
HCE Spring	.0265	4	9.1	16	8.8	4.14	1
SERT Change	.0237	-6	3	0	2.8	3.0	15.0

Employment of Father

An interesting trend is noted in the category of "employment of father" (see Table 12). In all but two instances, groups of father unemployed had the highest means, with "father not present" being the group with the next

largest means. Performance IQ for fall and full scale IQ for spring were the two exceptions, and full scale IQ for spring was only .75 away from the highest mean for that variable. "Father employed" had 12 of 13 of the lowest means.

Table 12

Employment of Father
(Means)

	P	Unemployed	Employed	Not Present
IQ Fall	.0237	90	72	90.62
Verbal Fall	.0126	102	67.7	88.07
Performance Fall	.0376	78	80.7	95.54
IQ Spring	.0486	101	86.7	101.65
Verbal Spring	.0157	106	76.7	96.62
METRO Fall	.02	34	13.56	31.92
METRO Spring	.0197	62	40.78	59.67
METRO (%) Spring	.02	65	28.89	61.08
SE Correct Fall	.0541	16	4.78	11.69
SE Other Fall	.0232	3	.6	2.77
SE Total Fall	.0226	19	5.4	14.46
SE Correct Spring	.0373	21	7.8	15.69
SE Total Spring	.0446	22	9.2	17.62

Father's Education

Eight of 12 variables had the highest means in groups where the father's education equalled 12 years (see Table 13). In only one instance was the highest mean in a group where father's education was also the highest. In two cases the 0-7 year group (the lowest group) had the highest mean.

Table 13

Father's Education
(Means)

	P	0-7 yrs	8-11 yrs	12 yrs	12 years + or Kam grad.
IQ Fall	.0056	74	70.3	95.7	86.3
Verbal Fall	.0015	70	64.67	95	86.75
IQ Spring	.0222	91	84.78	104.78	100.25
Verbal Spring	.0011	80.5	73.11	103	95.75
METRO Fall	.0360	19	14.38	36.1	23.25
METRO Spring	.0117	69	38.25	61.1	55
METRO Spring (%)	.0132	79	24.75	62.89	53.75
SE Correct Fall	.001	9	1.88	14.2	12.5
SE Total Fall	.0006	11	2.5	16.89	15.5
Total Approp Fall	.003	13.5	8.5	24.2	22.5
SE Correct Spring	.0112	13	6	16.78	18
SE Total Spring	.0139	13.5	7.4	18.78	20

Mother's Education

Unlike "father's education," in the "mother's education" category, the highest group mean in all but one group (see Table 14) was found in the highest possible education group (more than 12 years, or Kam grad). The one exception, SE busts for spring, had the highest mean in the lowest education group, and the lowest mean in the highest education group. Six of 15 of the lowest means were in the 8-11 group; 8 of 15 were in the lowest education group.

Table 14

Mother's Education
(Means)

	P	0-7 yrs	8-11 yrs	12 yrs	12 years + or Kam grad.
IQ Fall	.007	71	65	87	95
Verbal Fall	.0120	61	62	85	93
Performance Fall	.0191	86	73	92	98
IQ Spring	.0085	81	81.6	98	108
Verbal Spring	.0088	64	72.5	93	102.8
METRO Fall	.023	17	9	29	34
METRO Spring	.0095	47	33.6	55	65
METRO Spring (%)	.0095	35	17.2	53	70.8
SE Correct Fall	.0142	0	3.66	9.9	16
SE Total Fall	.0480	0	5.83	11.9	18
Approp Total Fall	.0376	0	11.16	19.63	24
SE Correct Spring	.0054	6	5.6	12.9	21.6
SE Total Spring	.0048	6	6.5	15.08	23.4
Approp Total Spring	.0029	9	17.5	23	27
SE Busts Spring	.0031	20	11.5	5.92	2

Summary

It has not been the intention of this paper to imply that there is a definite cause-and-effect relationship between any part of the KEEP kindergarten program and test scores of the participants of the program. Instead, the purpose was to report trends which occurred in KEEP's Class 2. Certain groups of children did improve their test scores a sizeable amount while others did not. The precise reasons why this was so, or an exhaustive description of the groups is not possible at this time. All that can be done is to indicate when changes did occur and to suggest possibilities as to why this was so.

Test scores from the WPPSI, METRO, and SERT pointed to an encouraging trend in the development of skills and knowledge appropriate to a 5-6 year old child preparing for first grade work. The large increases in IQ, reading readiness, and standard English skills suggested interpretations about the quality of instruction at KEEP. Although the project is still in its formative years, the progress that individual children and Classes 1 and 2 as wholes have demonstrated is indeed promising. It is unclear what methods of instruction allow for such improvement in KEEP classes, however this is one of the focal points for present and future research.